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ABSTRACT

The capital improvement program presented to the Regents of the University of California comprises charts and graphs depicting--(1) the basic academic elements which influence the program, (2) basic elements of cost, (3) the scope of the total program in dollars, and (4) the management of the program from the inception of a project through design and construction to occupancy and maintenance. Typical elements illustrated are academic space requirements, student mix, area standards, capital outlay by year, building project schedule, and flow chart of personnel involved. (HH)

ED037896

The University of California's Capital Improvement Program

EF 002 002

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President of the University

BERKELEY, CALIFORNIA 94720

September 30, 1966

Foreword

In April 1966, a comprehensive analysis and report on the University of California's Capital Improvement Program was presented to The Regents of the University. The report included charts and graphs depicting the basic academic elements which influence the program, basic elements of cost, the scope of the total program in dollars, and the management of the program from inception of a project through design and construction to occupancy and maintenance.

In response to the numerous requests for reprints of the charts, and for an explanation of the Capital Improvement Program of the University, we are happy to make available the following report.

Sincerely yours,

Clark Kerr

Clark Kerr

Enclosure

The University of California's Capital Improvement Program

To achieve an appropriate campus environment conducive to higher education is an enormous and challenging task. It requires long and consistent effort in carefully integrating academic programming with budgetary and physical planning. At the University of California, an annual Capital Improvement Program is used to guide this process. The following is an explanation of the Program and its management.

California's Master Plan for (Public) Higher Education is fostered at three levels: Junior (Community) Colleges, the California State Colleges, and the University of California. Under the plan, the University provides "instruction in the liberal arts and sciences, and in the professions." In addition, the University is a public service and an agency for research.

To perform its function, the University operates nine general campuses (Chart 1) and owns or operates more than 100 other facilities including field stations, research stations, laboratories, extension centers, and service units throughout the State (Chart 2). Total land area owned by the University exceeds 40,000 acres.

The Capital Improvement Program (Chart 3) is the University's project-by-project implementation of Long Range Development Plans (LRDP's) prepared for each campus. Merging needs with resources, the Program includes every proposed project costing $65,000 or more planned for an ensuing five-year period. In addition to providing for needed academic and administrative space, the Program includes service facilities, utilities, site development, land acquisition, landscaping, and other items suggested in Chart 4. (A Minor Capital Improvement Program is established under separate procedures for capital projects costing less than $65,000.)

Shown in Chart 5 are the factors that interact to affect the total amount of academic space required: enrollment; the proportion of students in the lower division, upper division, and graduate division; faculty-student ratios; and varying levels of research. Projected enrollment increases indicate the coming need for additional space: In 1965, the University enrolled 78,000 students; 1970 estimates indicate an enrollment of 109,000 students; and by 1975, 136,000 students are expected.

Chart 6 highlights enrollment increases: in the late 1940's the return of World War II veterans to college forcing the construction of many temporary buildings on the University's campuses; and in the early 1960's the "war baby boom" of the 40's reaching college age. To accommodate this latest surge, the University added its newest campuses, Irvine, Santa Cruz, and San Diego. All three were operating by 1965. To meet the growing needs of public higher education in California, present University plans call for the opening of a new San Francisco or North Bay campus by 1972, a new Los Angeles area campus by 1975, and subject to further study, three additional campuses yet undesignated.

The increasing number of students, however, is only one of the factors that bring about expansion of the physical plant. The University must also grow to accommodate compositional changes within the total student body. Chart 7 illustrates one compositional change in student population: graduate enrollment. The number of graduate students is expected to increase from only 8,000 (or 24%) in 1954 to 40,000 (or 36%) by 1970. The impact such a change will have on the total need for space can be traced in Chart 8, which shows the amount of assignable square feet of academic building space needed per "full-time-equivalent" student and faculty.

In addition to graduate instruction requiring four times as much laboratory and classroom space per student as does undergraduate instruction, it must be realized that it takes three times as many faculty to teach graduate students as to teach lower division students, and that over twice as many faculty are required to teach upper division students as are required to teach lower division students. Consequently it is quite possible for two departmental programs having the same number of students but differing in student mix and subject field to vary by ten times in space requirements.

The construction cost of space also varies with the academic program. Chart 9 presents examples of square foot costs, including Group 1 (fixed building) equipment, for different types of buildings. To this must be added Groups 2 and 3 (movable) equipment, exterior site development, and management costs to arrive at total project cost (Chart 10). In most

instances the building itself (structure with walls, roof, and floor) represents less than half of the total project cost.

The rising cost of construction, increasing at almost 4% annually over the past ten years, is portrayed by the Engineering News Record Construction Cost Index shown in Chart 11. The Index serves as a guide for augmenting University building projects because of cost escalation.

Accommodating the student population that has doubled in size during the past fifteen years requires the large sums of capital outlay shown in Chart 12. An analysis of total expenditures (Chart 13) illustrates that non-academic functions account for one-third of all funds expended in campus development. The summary of the Capital Program for the next five-year period, 1966–71 (Chart 14), describes the anticipated economic commitment of the State of California to public higher education.

Chart 15 indicates the University's current sources of capital outlay funds. The importance of Federal support in the form of construction grants cannot be overstated. Federal grants (Chart 16) have increased from $3.3 million (or 6%) of the Capital Improvement Program in 1960 to $39.5 million (or 40%) in 1965.

Because capital budgets of California State agencies are prepared and funded on an annual basis, each project in the program is scheduled for funds in the year they are likely to be used (as opposed to total funding at one time). For example, as Chart 17 illustrates, a typical building needed in 1970 would receive its funds for preliminary planning in the 1966–67 capital outlay budget, for working drawings in 1967–68, for construction in 1968–69, and for equipment in 1969–70. A smaller project might be funded over fewer years.

In general, the funding schedule is determined by the size and nature of the project and follows an established pattern based upon previous experience with similar projects. The physical planning and construction process, from concept to occupancy, is also illustrated in Chart 17.

The scope of the Program is shown in Chart 18, which apportions over 300 projects among the various stages of development, from programming through construction.

The management of the University's Capital Improvement Program, dependent upon many specialists at various levels of authority, is shown in Chart 19. The chart illustrates how each project, originating at an individual campus, proceeds through the management stages of planning, development, coordination, budgeting, funding, appropriation, and execution.

The staff of the University-wide Office of The Vice President—Physical Planning and Construction (shown as the "middle bar" on Chart 19 and in greater detail on Chart 20) is charged with setting over-all policies and standards, undertaking research, and administering the Capital Improvement Program. A similar structure, reflecting the function of the University-wide office, exists for project management and execution at each campus (Chart 21).

The division of architectural effort, by the amount of time expended during the staging of any specific project, is illustrated in Chart 22: the University Architect represents the University-wide organization; the Consulting Architect, a leading private architect, is retained to provide professional advice to each campus; the Campus Architect, also a University of California employee, heads the program of Physical Planning and Construction at each campus; and the Executive Architect, a private individual or firm, provides by contract agreement the specific service (from design through construction) for an individual building on a campus.

In summary, the Capital Improvement Program is the result of the endeavor by faculty, administrators, and professionals to use the University's capital funds wisely and intelligently. To this end the Program reflects efforts to seek the best balance among first cost, continuing costs, and assurance of a level of environmental quality for which the University is known and of which citizens of the State can be justly proud.

Elmo R. Morgan
Vice President—
Physical Planning and Construction

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CAMPUSES UNIVERSITY OF CALIFORNIA

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PRINCIPAL PROPERTIES UNIVERSITY OF CALIFORNIA

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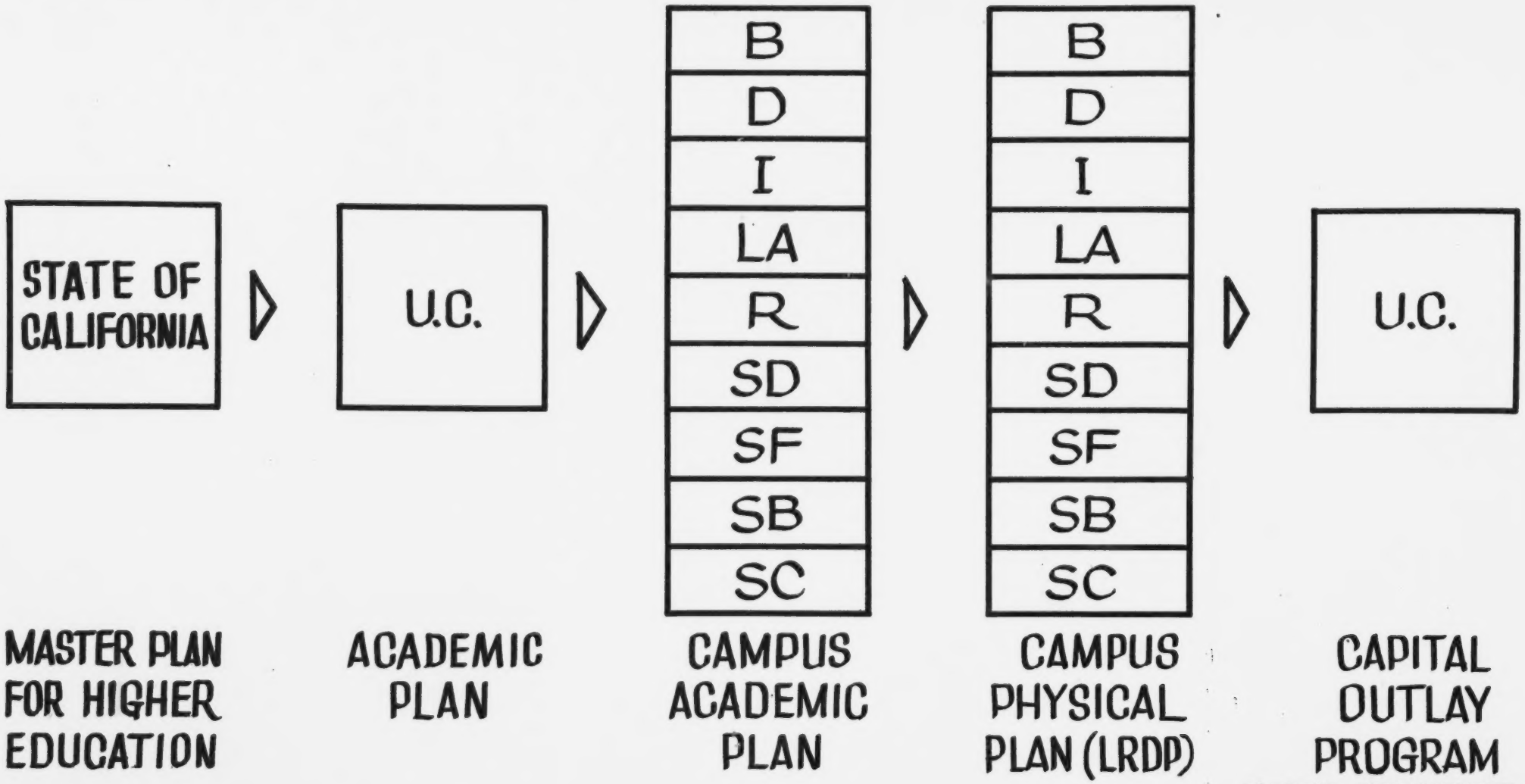
Capital Outlay Program:
TRANSLATING ACADEMIC PLANS INTO PHYSICAL ENVIRONMENT



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NON-ACADEMIC REQUIREMENTS

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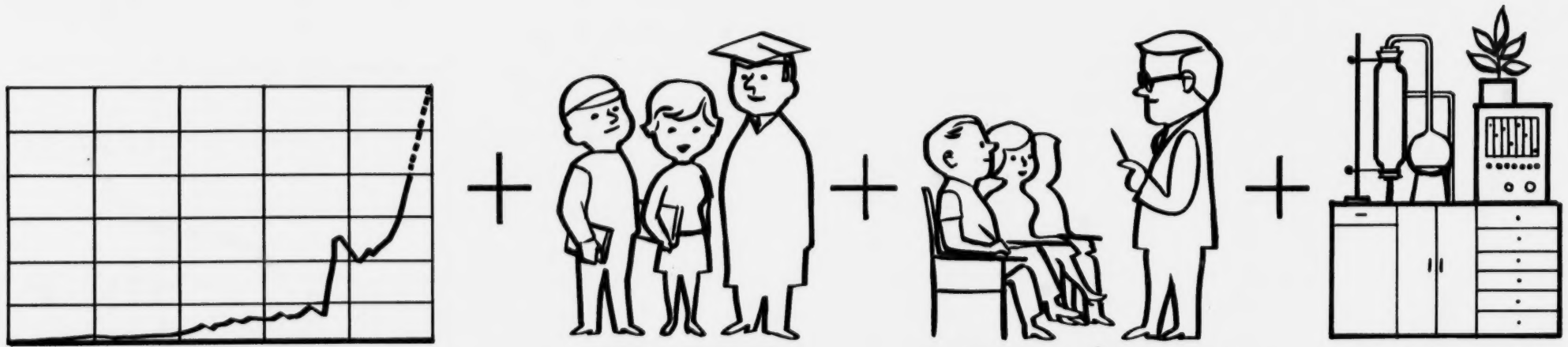
BASIC ELEMENTS OF INFLUENCE

Academic



= ACADEMIC SPACE REQUIREMENTS

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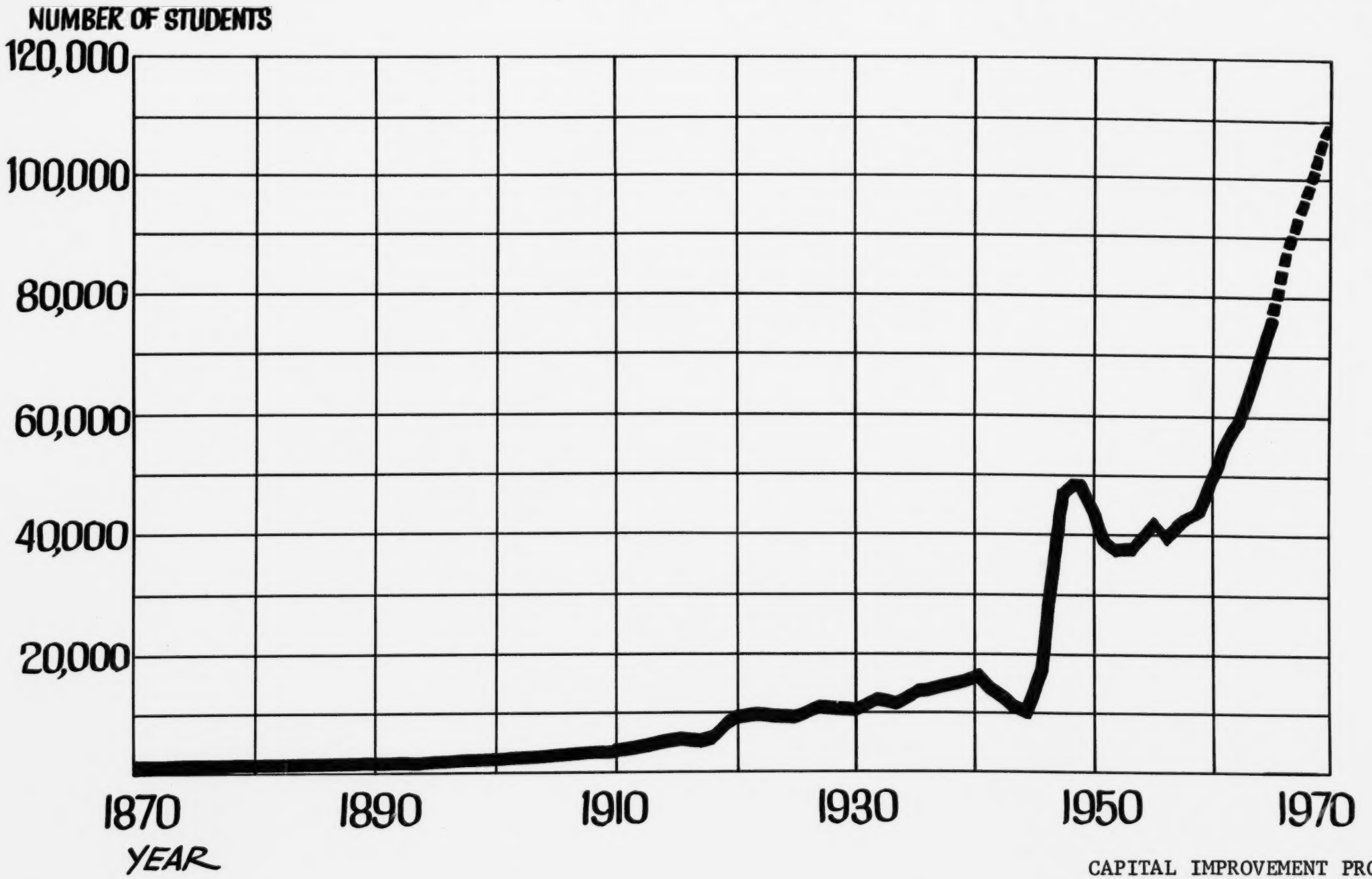
ENROLLMENT 1870-1970



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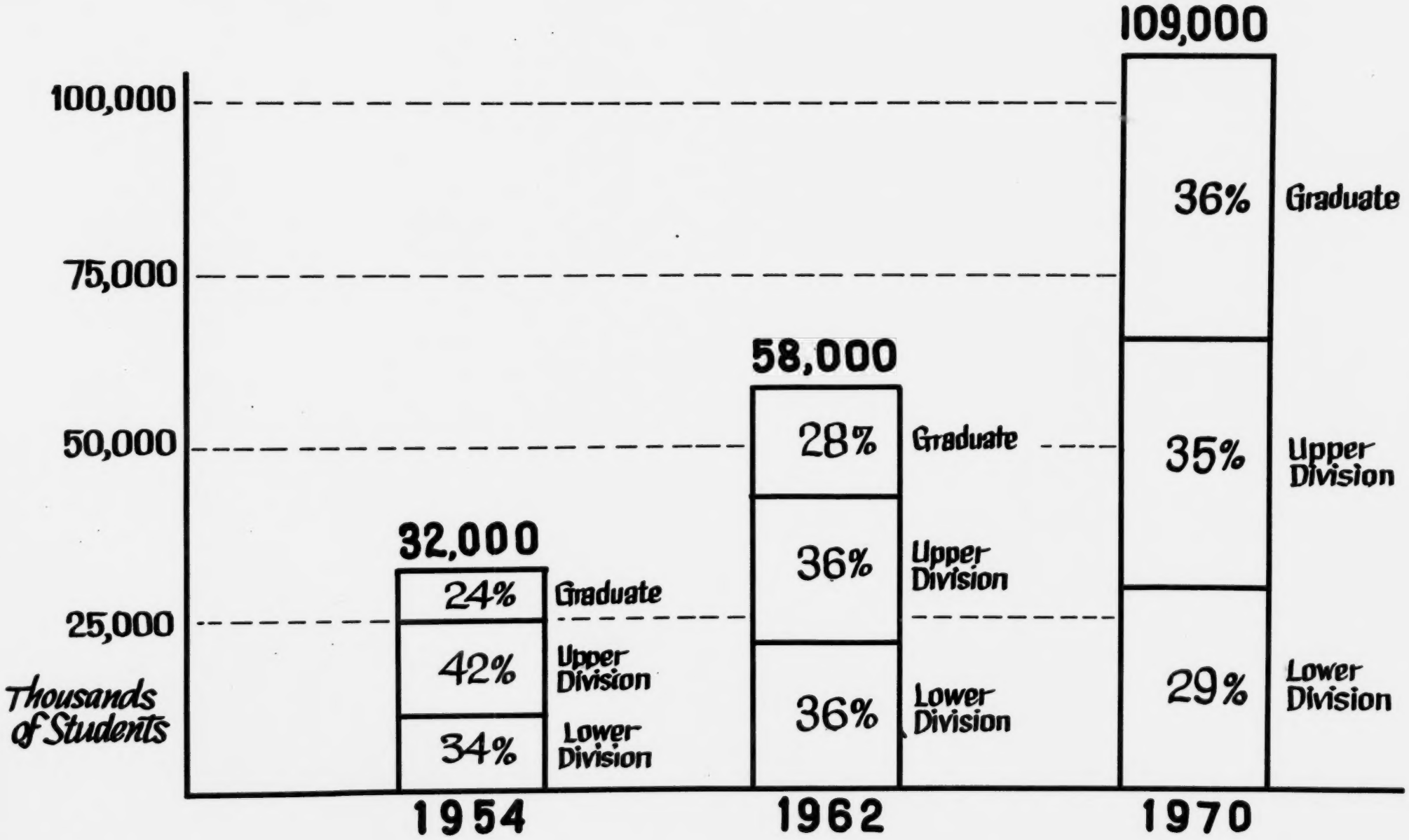
CHANGING STUDENT "MIX"



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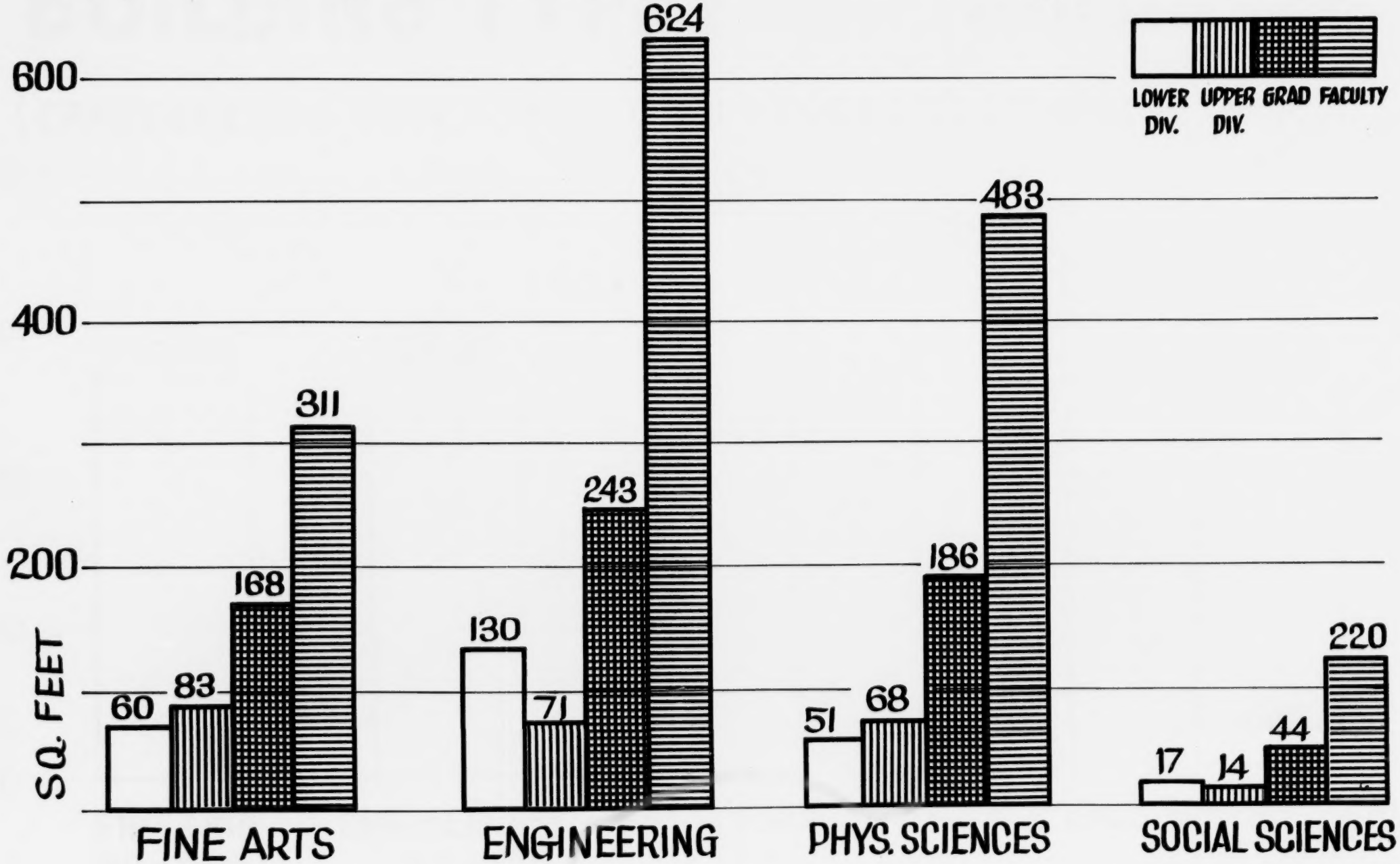
ASSIGNABLE AREA STANDARDS

(Square Feet per FTE Student and FTE Faculty)



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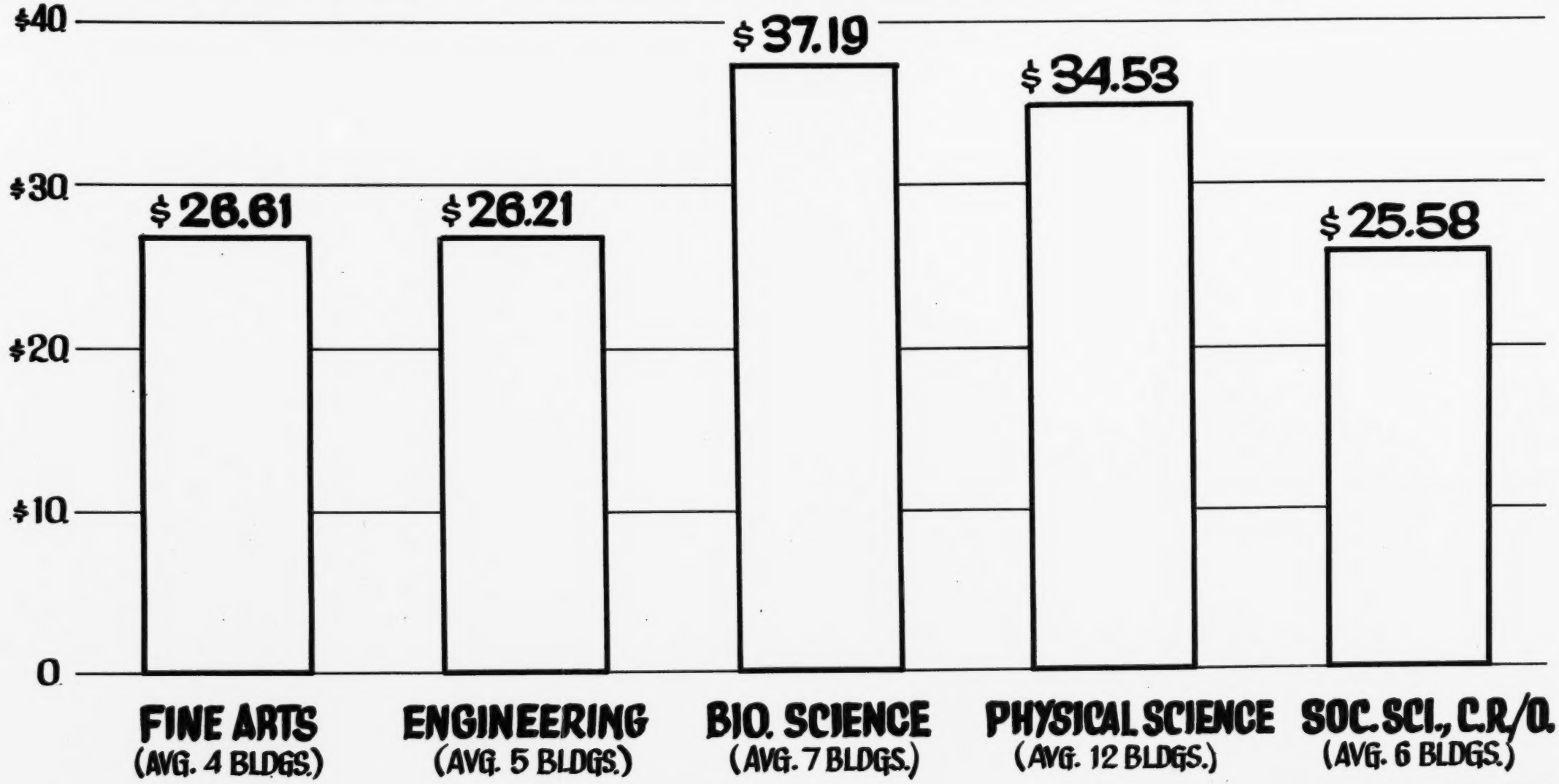
UNIT COSTS OF BASIC U.C. BUILDING TYPES

DOLLARS PER SQUARE FOOT – GROSS AREA

(CONSTRUCTION ONLY – INCLUDING GROUP 1 EQUIPMENT/ENR=1050)



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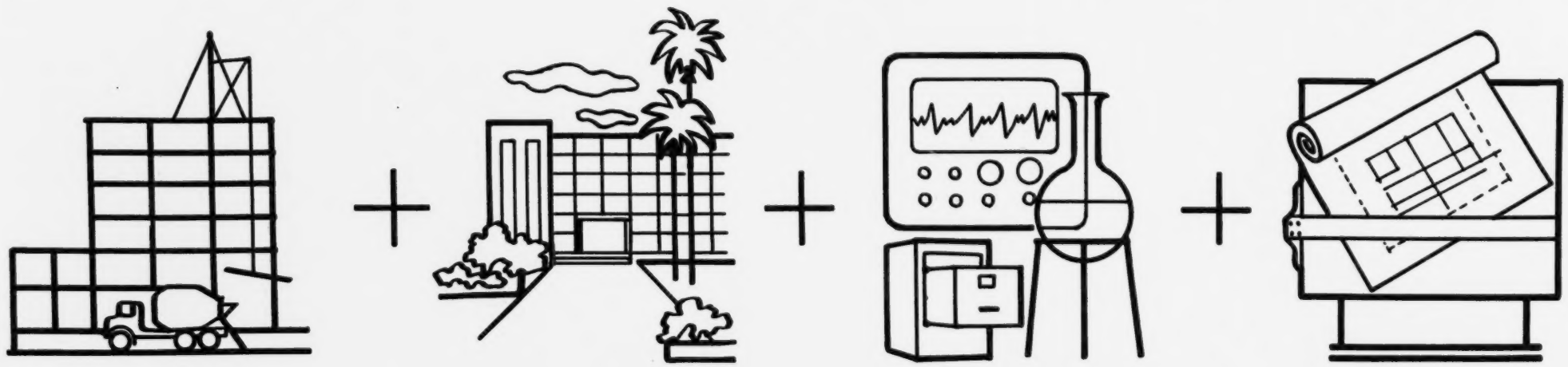
BASIC ELEMENTS OF COST

Typical Project



BUILDING COSTS + SITE DEVELOPMENT AND UTILITIES + EQUIPMENT COSTS + PLANNING MANAGEMENT AND FEES

= TOTAL PROJECT COST

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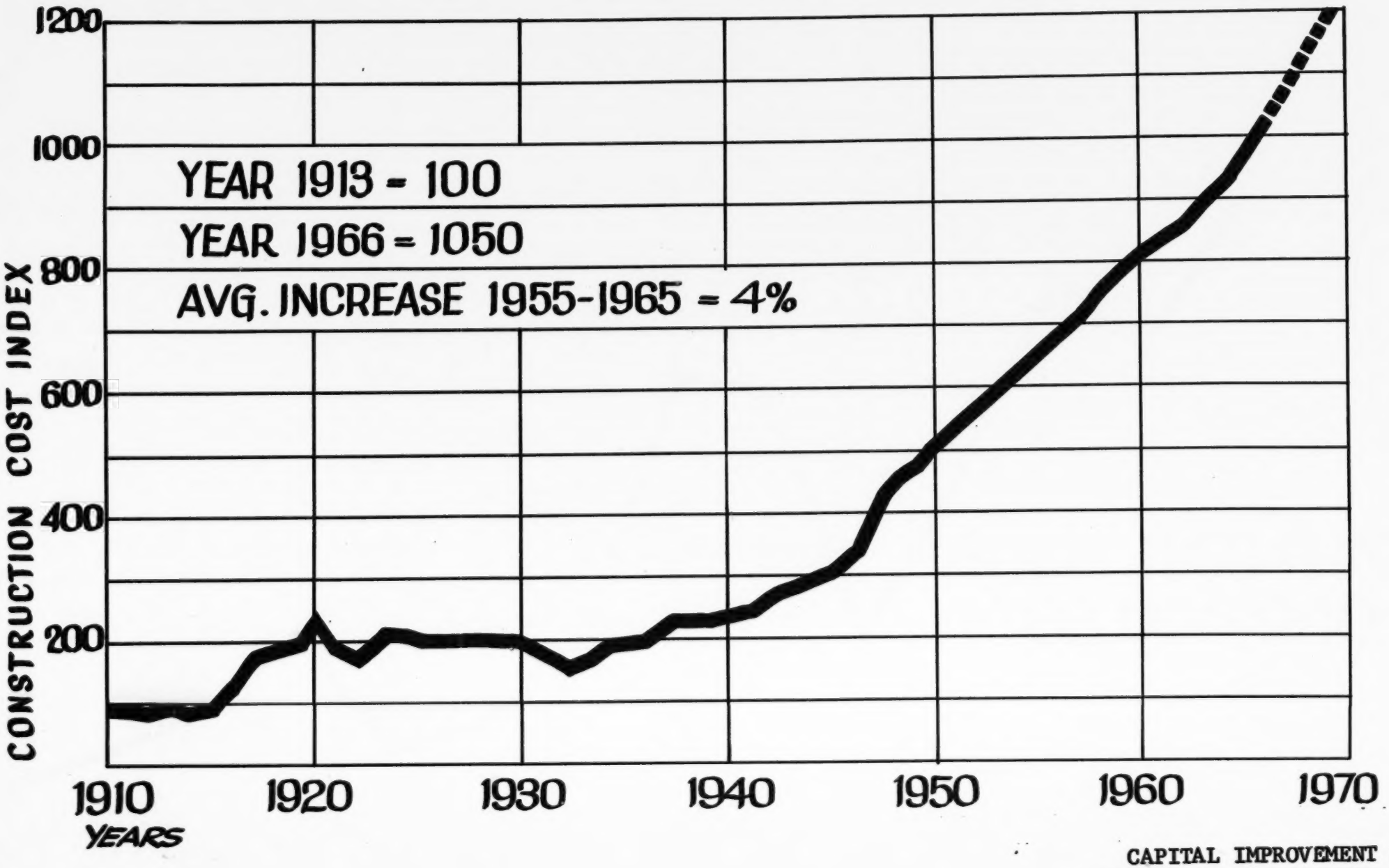
E.N.R. CONSTRUCTION COST INDEX



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CAPITAL OUTLAY APPROPRIATIONS ACQUIRED BY FISCAL YEAR

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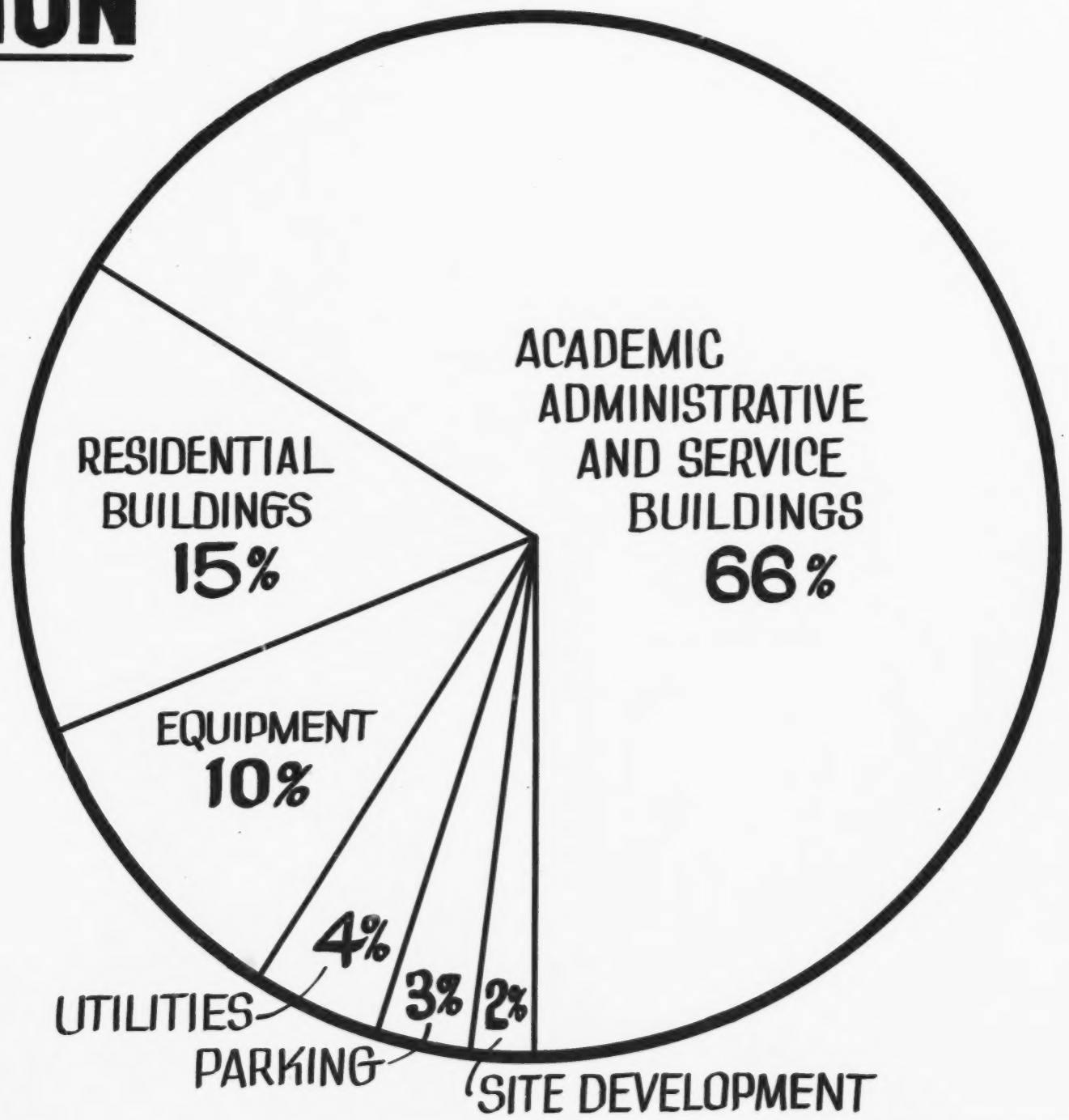
DISTRIBUTION TYPICAL CAPITAL OUTLAY*



* *Excluding Land Acquisition*

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Summary:
1966-1971 MAJOR CAPITAL IMPROVEMENT PROGRAM

SOURCE

General State Funds	$ 404,100,000
Loan Funds	$ 118,900,000
Non-State, Non-Loan Funds	$ 162,200,000
TOTAL	$ 685,200,000

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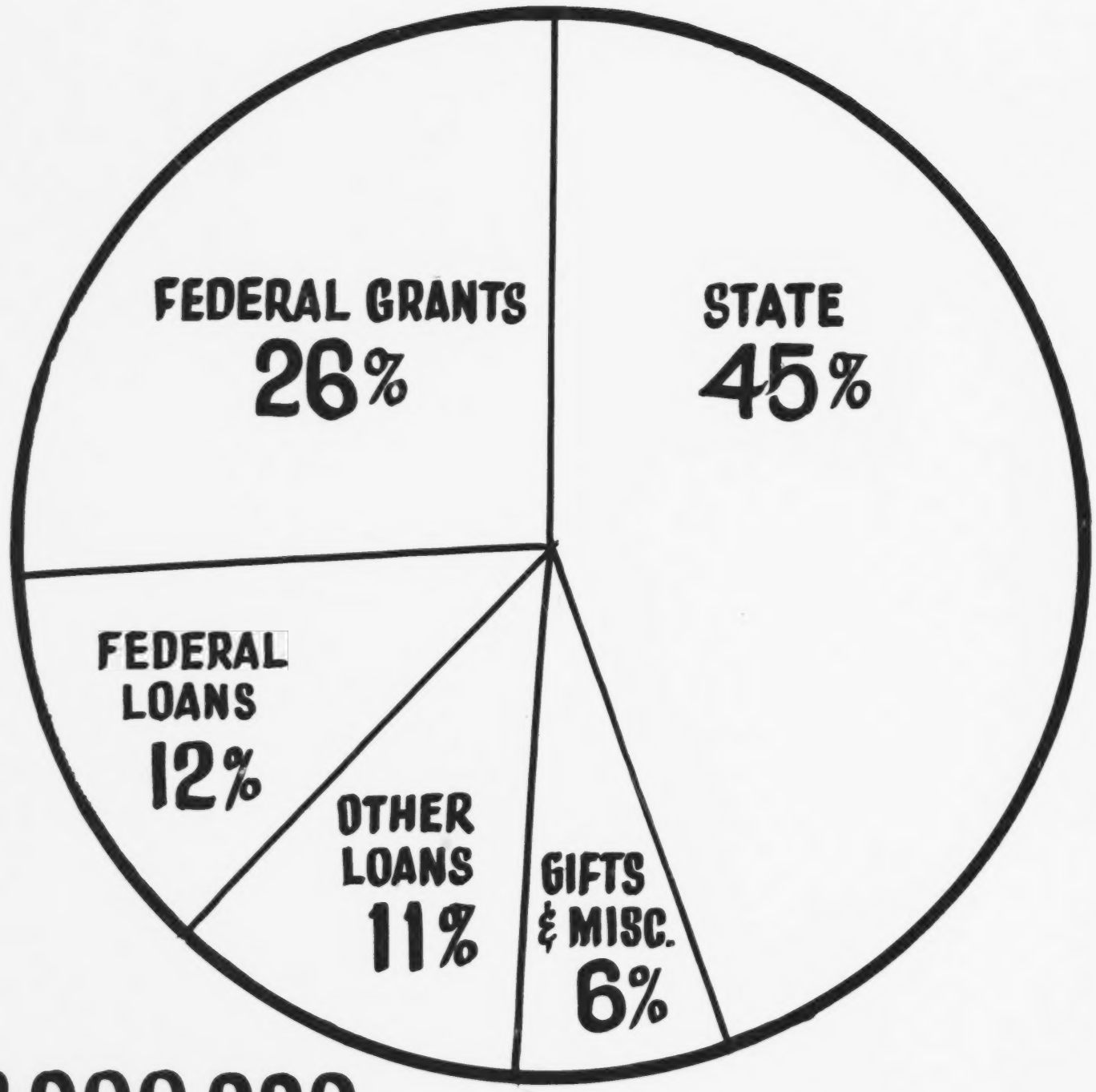
Sources: CAPITAL OUTLAY FUNDS 1964-1965



Total Value $143,000,000.

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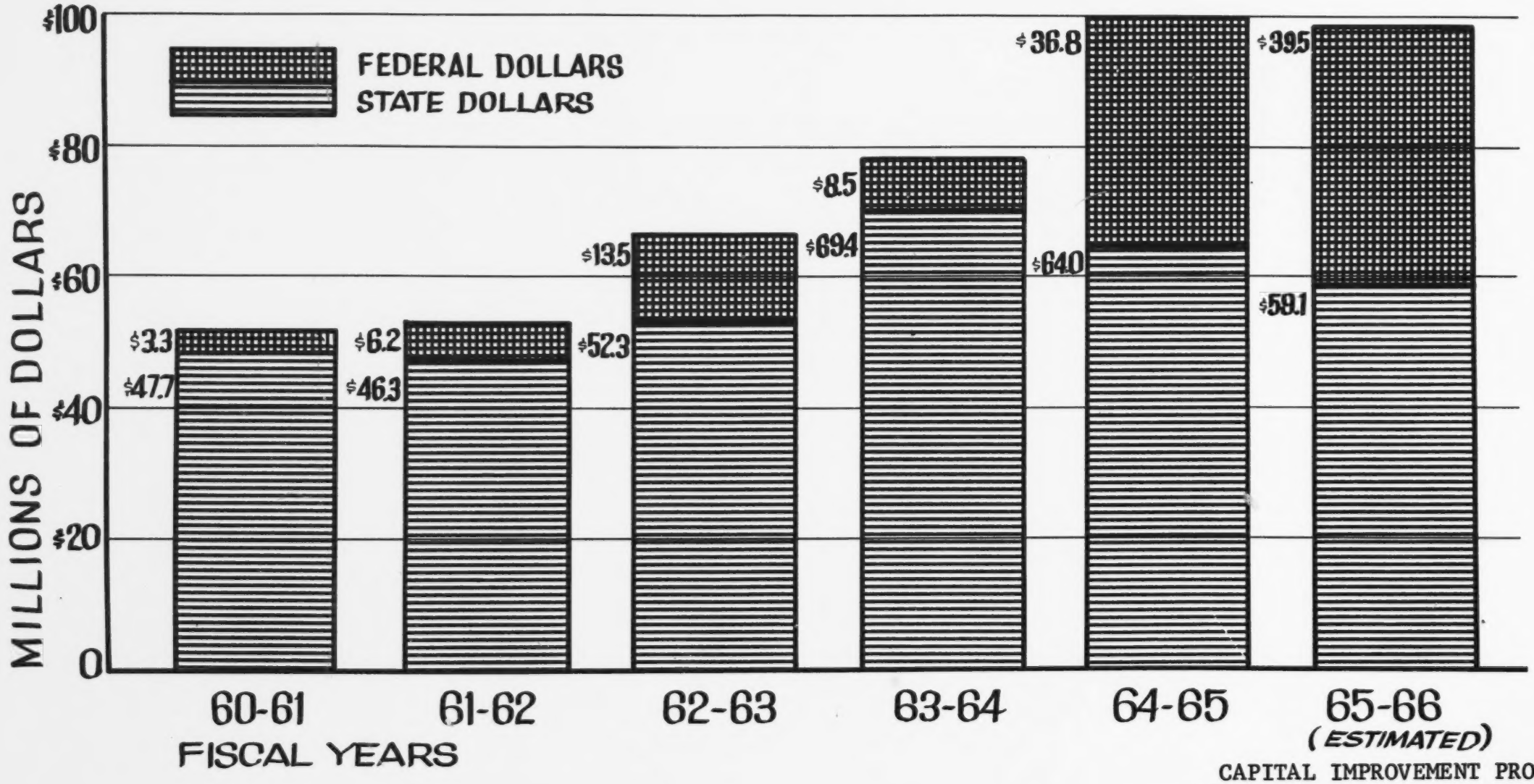
FEDERAL CONSTRUCTION GRANTS* COMPARED TO STATE CAPITAL OUTLAY APPROPRIATIONS

*ALL LOAN FUNDS EXCLUDED



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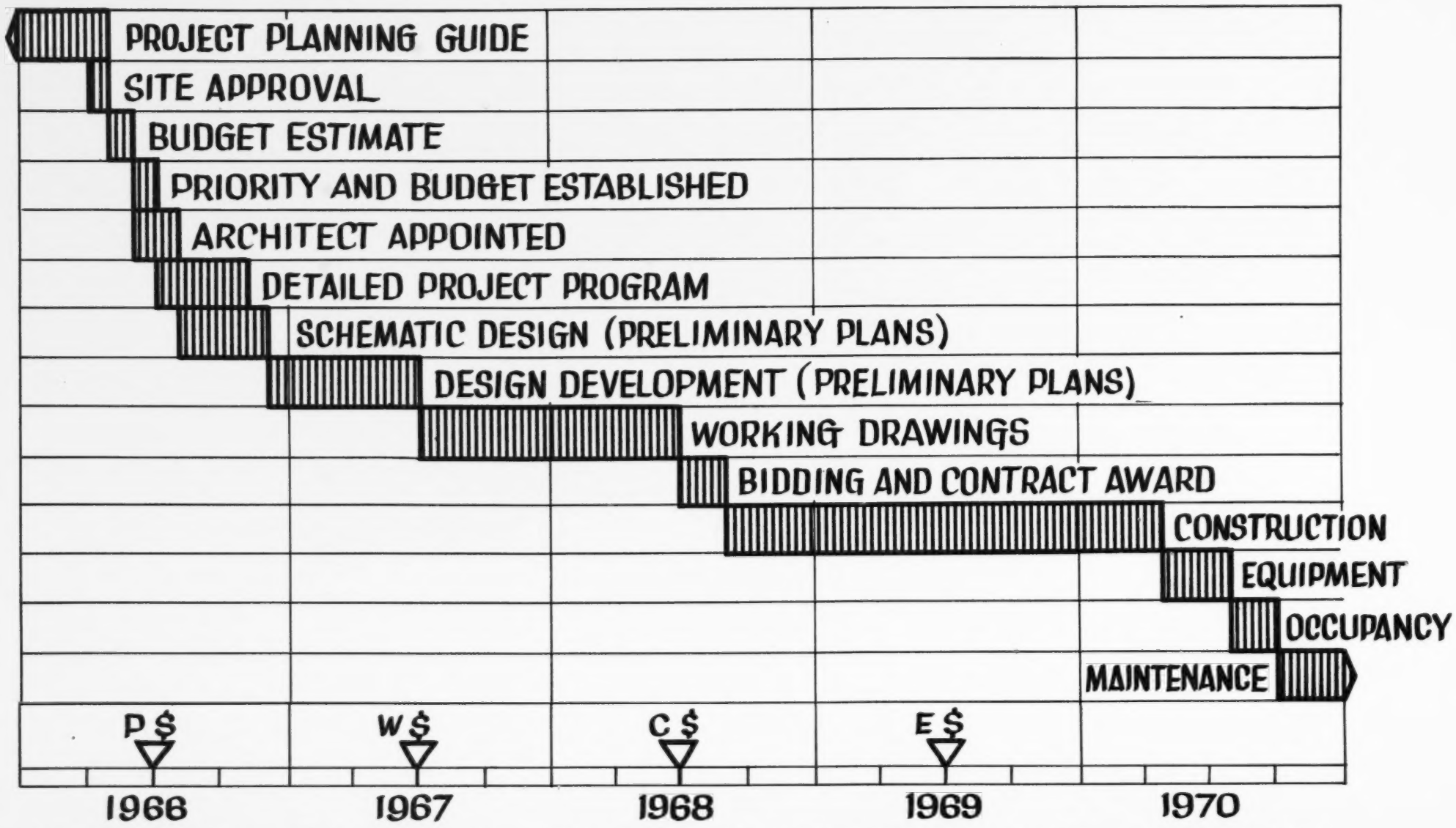
TYPICAL BUILDING PROJECT SCHEDULE

FOR OCCUPANCY TO MEET DEMAND – September, 1970



SEQUENCE OF STATE FUNDING SHOWN BY ▽ SYMBOL

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Summary:
CURRENT BUILDING PROGRAM PROJECTS
March, 1966

STAGE	NUMBER	VALUE
Programming	61	$123,890,000
Preliminary Design	92	$198,120,000
Working Drawing	52	$166,500,000
Construction	102	$260,460,000
TOTAL	307 Projects	$748,970,000

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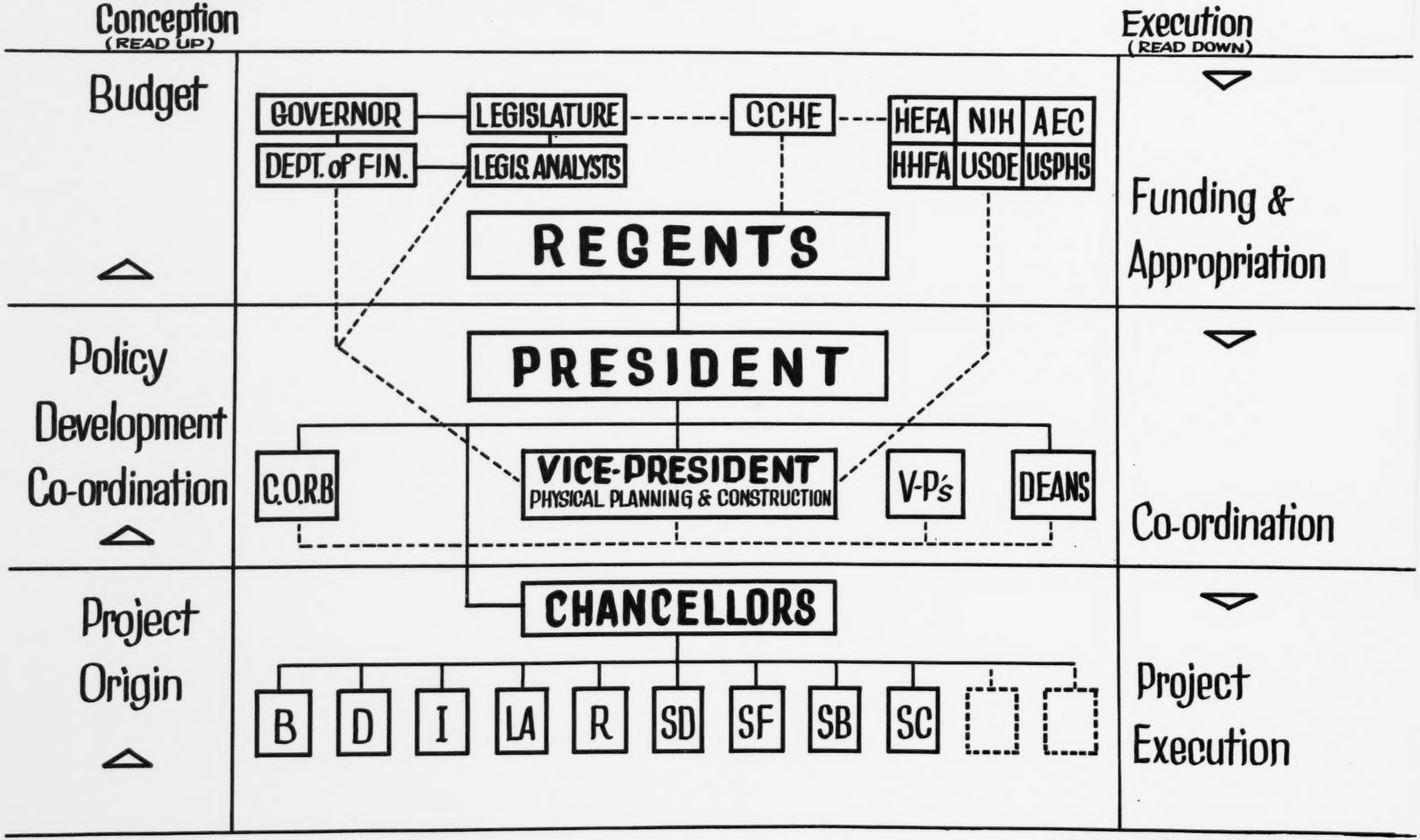
WHO IS INVOLVED



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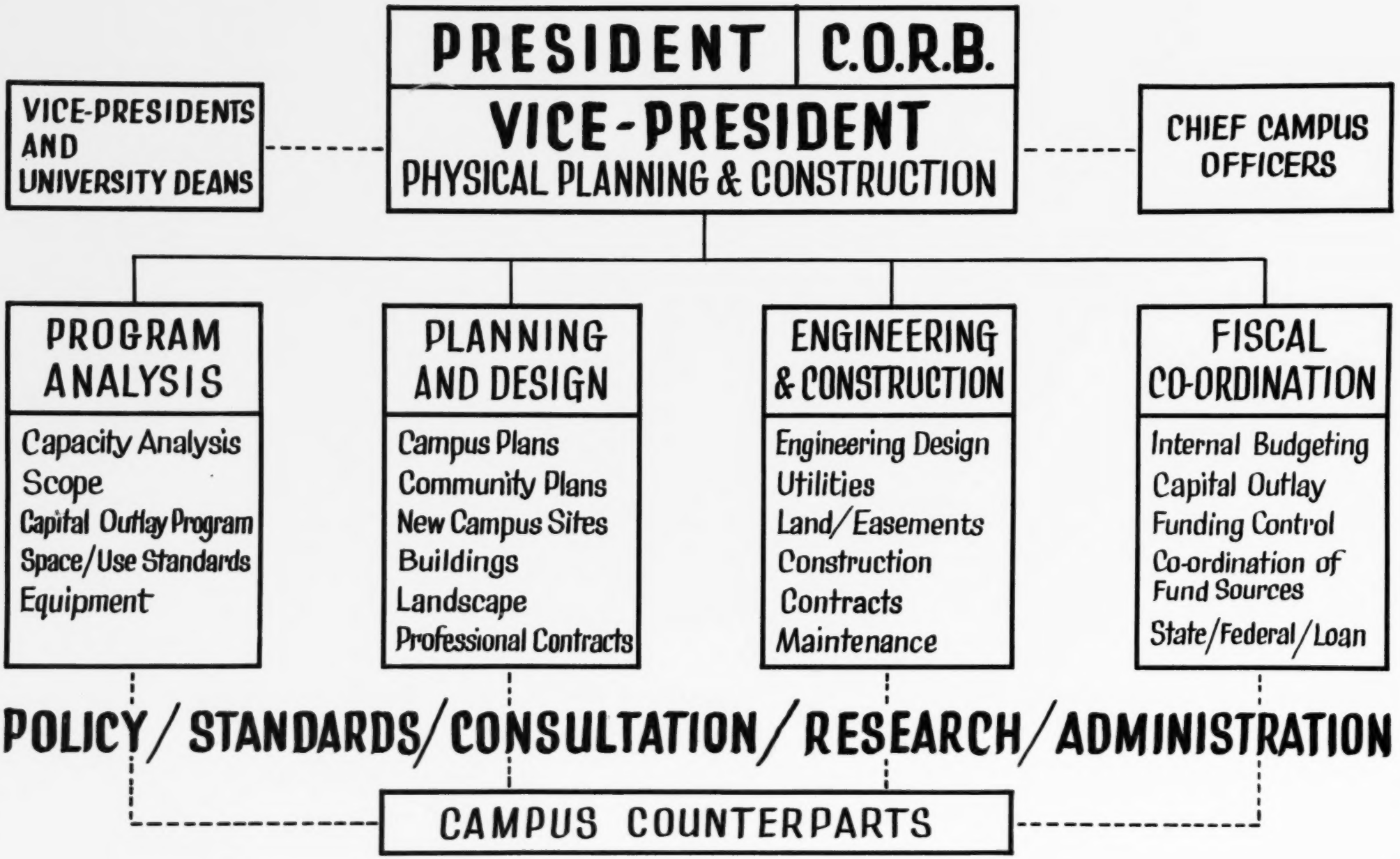
FUNCTIONAL ORGANIZATION/UW



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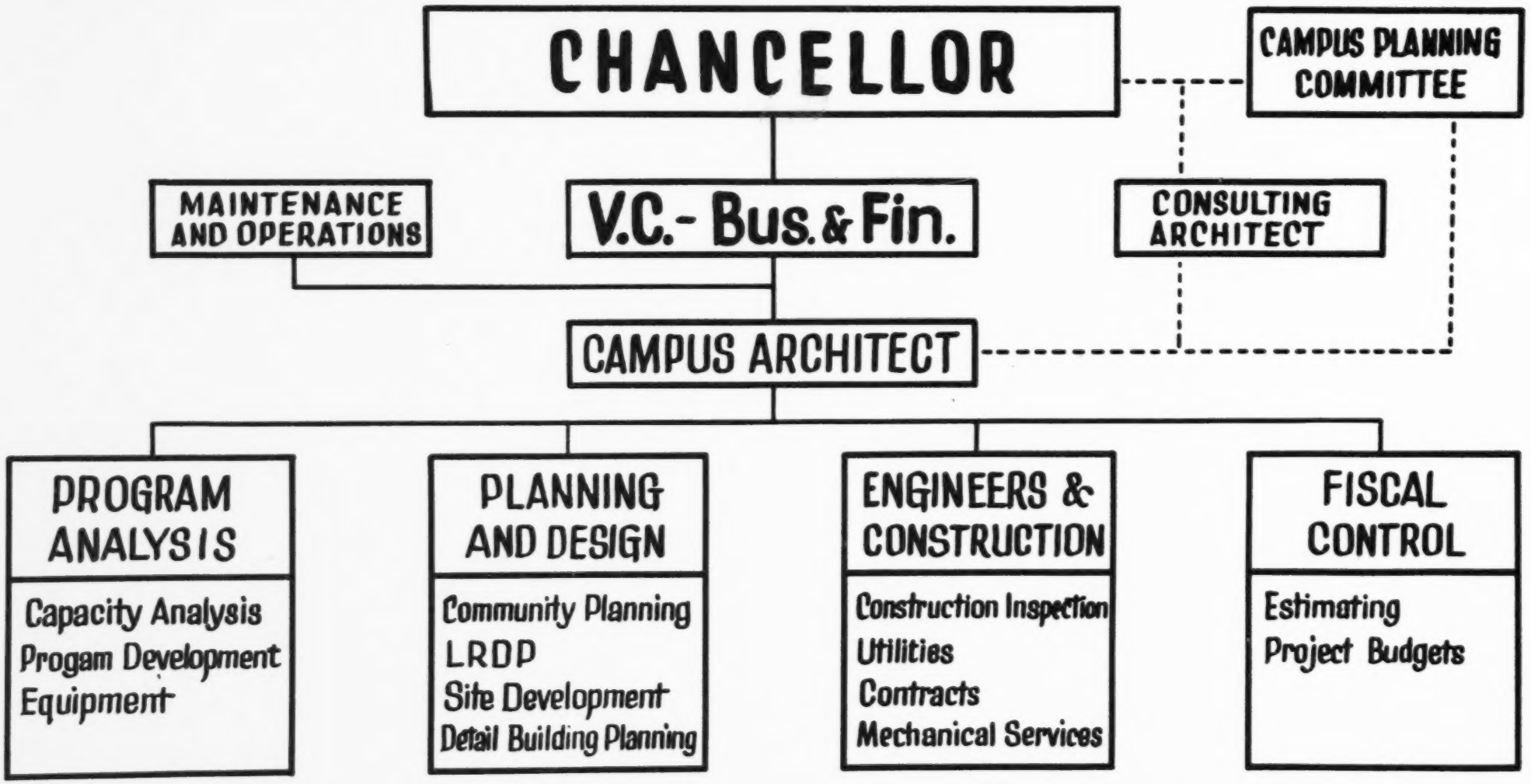
FUNCTIONAL ORGANIZATION/CAMPUS



PROJECT MANAGEMENT AND EXECUTION

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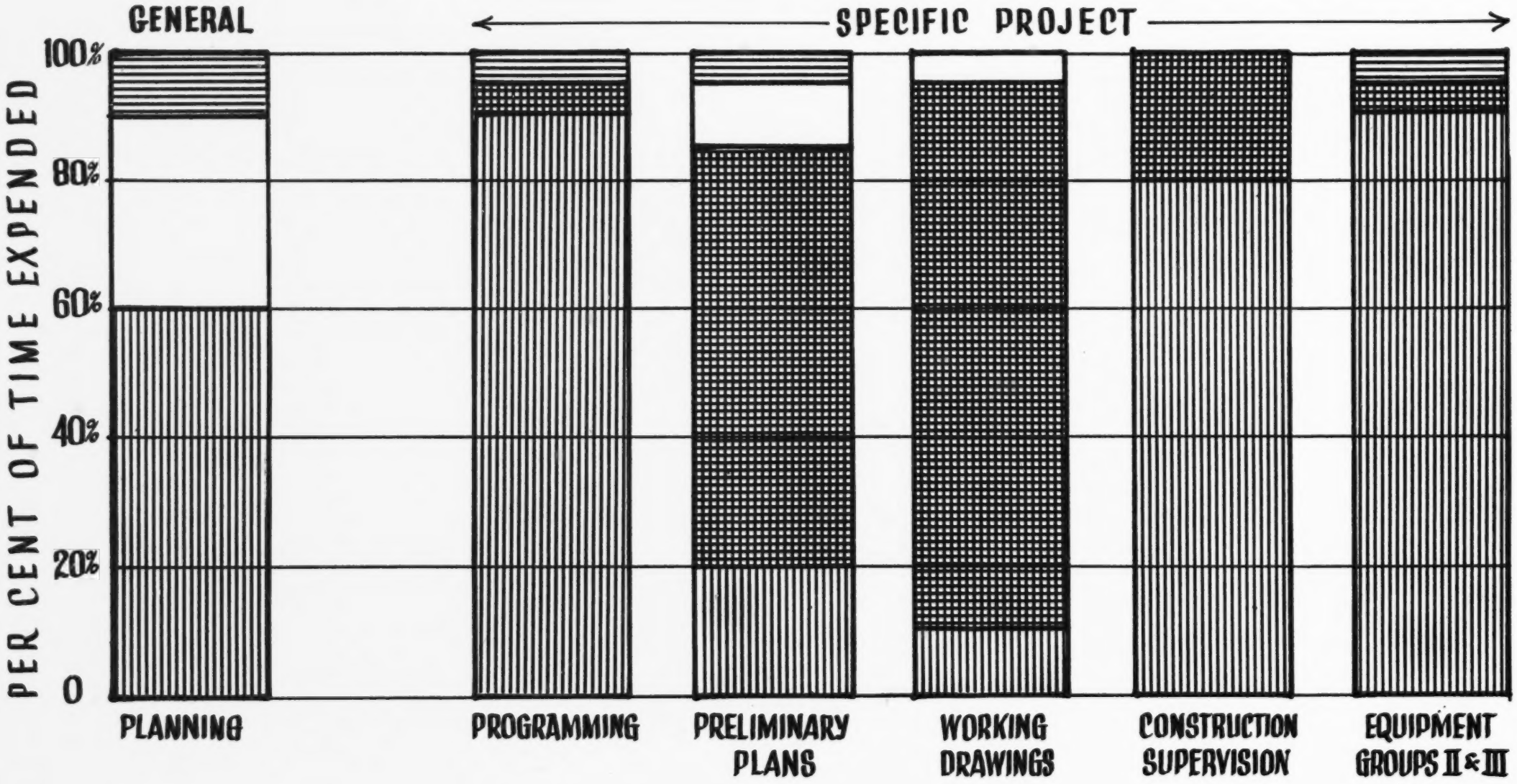
DIVISION OF EFFORT: BUILDING PROGRAM



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